Renewable Project Connect Experience in Thailand

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2. Status for Renewable Energy Generation
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1. Thailand Electricity Structure

Generation
- SPPs (10%)
- EGAT (43%)
- IPPs (42%)
- Import (3%)
- VSPPs (2%)

Transmission

Distribution
- PEA (66%)
- MEA (32%)
- Customer (2%)

Customer

National Energy Policy Committee

Energy Regulatory Commission
1. Thailand Electricity Structure

The power purchase from Private Power Producer

**IPP**: Independent Power Producer,
- Capacity > 90 MW
- (Power Purchased by Notice)

**SPP**: Small Power Producer, Capacity <= 90 MW
- Cogeneration, Firm
  (Power Purchased by Notice)
- Renewable Energy, Firm, Non-firm

**VSPP**: Very Small Power Producer, Capacity <= 10 MW
- Cogeneration
- Renewable Energy
Committed to the Development of Low-Carbon Society

Government Funding on R&D Activities

Alternative Energy Development Plan (AEDP: 2012-2021)

Encouraging Private-Led Investment

Target 25% of RE in Total Energy Consumption by 2021

**New Energies**
- Tidal: 2 MW, 3 MW
- Geothermal: 1 MW
- Solar: 3,000 MW, 4,800 MW
- Wind: 1,800 MW

**Hydro-electric**
- Micro: 324 MW
- Mini: 324 MW
- Pump Storage: -

**Bio-energy**
- Biomass: 4,800 MW
- Biogas: 3,600 MW
- MSW: 400 MW

**Biofuels**
- Ethanol: 9 Mill lt/d
- Biodiesel: 5.97 Mill lt/d
- New Fuel Replacing Diesel: 25 Mill lt/d
### Status of Renewable Project on May 2015 compared with the target in Alternative Energy Development Plan (AEDP) of 25% for 10 years as following

<table>
<thead>
<tr>
<th>Type of Fuel</th>
<th>COD Installed Capacity (MW)</th>
<th>Target AEDP (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar Farm</td>
<td>1,502</td>
<td>3,000</td>
</tr>
<tr>
<td>Solar Rooftop</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Wind</td>
<td>216</td>
<td>1,800</td>
</tr>
<tr>
<td>Hydro</td>
<td>15</td>
<td>324</td>
</tr>
<tr>
<td>Biomass</td>
<td>2,429</td>
<td>4,800</td>
</tr>
<tr>
<td>MSW</td>
<td>113</td>
<td>400</td>
</tr>
<tr>
<td>Biogas</td>
<td>235</td>
<td>3,600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,563</strong></td>
<td><strong>13,924</strong></td>
</tr>
</tbody>
</table>

Source: Draft Minutes of the Executive Committee of measures to promote electricity generation from renewable sources No.2/2558 (No. 5) on 24 March 2015
2. Status for RE

EA SOLAR (90 MW)

Located: Lampang Province
COD: Dec 2014
First Khorat Wind (SPP 90 MW)

Located: Nakhonratchasima Province
COD: Apirl 2012

Thai Solar Energy 5 MW

Located: Kanchannaburi Province
COD: 2013
2. Status for RE

Erawan Power (Sugar cane power plant)  
- 8 MW  
- Located Nongbualumpoo Province  

Decha Biogreen (Rice husk fuel)  
- 7.5 MW  
- Located Supanburi Province
2. Status for RE

Thai Biogas (palm oil wasted water)

2.8 MW Located Surathani Province

Mass Solid Waste (Land Fill)

Mass Solid Waste (Incineration)

Zenit Green 8 MW Located Kampangsarn Nakornpratam Province

6.5 MW Located Phuket Province
3.1 Reverse Power Flows
3.2 Voltage Control in Distribution Grid
3.3 Protection Coordination in Distribution Grid
3. Impact of RE Connection

3.2 Voltage control in distribution grid

Advanced voltage control for HV/MV transformer
3. Impact of RE Connection

3.3 Protection Coordination in distribution grid

Breaker-breaker Miscoordination

Recloser-fuse Miscoordination

Current through recloser
Current through fuse
4.1 Plan for Using Renewable Energy
   (Find Exactly RE Potential Area)
4.2 Redesign Power Grid for RE Connection
   (Expand Grid to RE Area)
4.3 Use Smart Grid Device & Equipment
   (Move to Smart Grid ERA)
4.1 Find Exactly RE Potential Area
4.2 Expand Grid to RE Area

- Solar
- Wind
- Micro Hydro

Cassava root
Bagasse
Empty bunches of oil palm
Corn maize
4.3 Use Smart Grid Device

Smart Level

100
- Pattaya SG Pilot Project (1,069 MTHB)
- Mae Sariang Micro Grid (265 MTHB)
- Kood & Mak Island Micro Grid (392 MTHB)

70

30
Total 1,781 MTHB (55.65 MUSD)

Stage 1
Planning & Pilot Project

Stage 2
Large Scale Expansion

Stage 3
Optimal Stage
- AMI Full area Expansion
- Self-healing enabled
- Virtual Power Plants
- Real time pricing (2-way)
- V2G enabled

PEA Smart Grid Roadmap

2012-2016
2017-2021
2022-2026
Year

- AMI Expansion to Major Cities
- SA/DA/FA Full Area Expansion
- SPP/VSPP Management System Expansion
- Micro Grid & Energy Storage Expansion
- Demand Response (DR)/Demand Side Management System (DSM)
- Intelligent EV Charging System

Provincial Electricity Authority
Renewable Energy First Priority
(Think the Environment First, Save the Earth)

THANK YOU

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